

Amendments to the Claims

The listing of claims will replace all prior versions, and listings of claims in the application.

1. (currently amended) A method for printing on a wafer, comprising:
 - (a) polarizing light according to a predetermined polarization pattern to produce a single polarized exposure beam having a polarization angle that varies across a cross-section of the beam relative to a center point in the beam;
 - (b) outputting the polarized exposure beam along an optical path toward a mask;
 - (c) illuminating the mask in the optical path with the polarized exposure beam to produce an image in the exposure beam; and
 - (d) exposing a photoresist layer on the wafer in the optical path with light in the exposure beam.
2. (previously presented) The method of claim 1, wherein said step (a) further comprises producing the polarized exposure beam according to a radial polarization pattern.
3. (previously presented) The method of claim 1, wherein said step (a) further comprises producing the polarized exposure beam according to a tangential polarization pattern.

4. (previously presented) The method of claim 1, wherein said step (a) further comprises producing the polarized exposure beam according to a custom polarization pattern.
5. (original) The method of claim 1, wherein said step (a) further comprises producing polarized quadrupole illumination.
6. (previously presented) The method of claim 1, further comprising pre-polarizing light at an illumination source prior to said pattern polarizing step (a).
7. (previously presented) The method of claim 1, wherein said step (c) comprises illuminating a mask to produce an image that includes contact holes.
8. (previously presented) The method of claim 1, wherein said step (d) occurs in a liquid.
9. (previously presented) The method of claim 1, wherein the mask is at least one of the group consisting of: chromeless phase-shift mask, attenuating phase-shift mask, and alternating phase-shift mask.
10. (previously presented) The method of claim 1, wherein the mask is a binary mask.

11. (currently amended) A method of printing on a wafer, comprising:
 - (a) polarizing light according to a predetermined polarization pattern to produce a single polarized exposure beam having a polarization angle that varies across a cross-section of the beam relative to a center point in the beam;
 - (b) outputting the polarized exposure beam along an optical path;
 - (c) illuminating a chromeless phase-shift mask in the optical path with the polarized exposure beam to produce an image in the exposure beam; and
 - (d) exposing a negative photoresist layer on the wafer in the optical path with light in the exposure beam.

12. (currently amended) A method of printing on a wafer, comprising:
 - (a) polarizing light according to a predetermined polarization pattern to produce a single polarized exposure beam having a polarization angle that varies across a cross-section of the beam relative to a center point in the beam;
 - (b) outputting the polarized exposure beam along an optical path;
 - (c) illuminating an attenuating phase-shift mask in the optical path with the polarized exposure beam to produce an image in the exposure beam; and
 - (d) exposing a positive photoresist layer on the wafer in the optical path with light in the exposure beam.

13. (currently amended) A method of printing on a wafer, comprising:

- (a) polarizing light according to a predetermined polarization pattern to produce a single polarized exposure beam having a polarization angle that varies across a cross-section of the beam relative to a center point in the beam;
 - (b) outputting the polarized exposure beam along an optical path;
 - (c) illuminating a binary mask in the optical path with the polarized exposure beam to produce an image in the exposure beam; and
 - (d) exposing a positive photoresist layer on the wafer in the optical path with light in the exposure beam.
14. (currently amended) A method of printing on a wafer, comprising:
- (a) illuminating a phase-shift mask with pre-polarized light to produce an image in the pre-polarized light;
 - (b) outputting the pre-polarized light from the phase-shift mask along an optical path;
 - (b) shaping the pre-polarized light with a pattern polarizer in a projection optic in the optical path to produce an exposure beam, wherein the pre-polarized light is shaped according to a predetermined polarization pattern and intensity pattern, wherein the polarization pattern has a polarization angle that varies across a cross-section of the polarization pattern relative to a center point in the polarization pattern; and
 - (c) exposing a photoresist layer on the wafer in the optical path with the exposure beam.

15. (currently amended) A lithography system, comprising:
 - (a) an illumination source that emits illumination light along an optical path;
 - (b) a pattern polarizing device that converts the illumination light from the illumination source into an exposure beam with a predetermined polarization pattern and outputs the exposure beam into the optical path, wherein the polarization pattern has a polariation angle that varies across a cross-section of the polarization pattern relative to a center point in the polarization pattern;
 - (c) a mask that produces an image in the exposure beam, wherein the mask includes contact hole features having a pitch; and
 - (d) a projection optic that relays the exposure beam for printing on a wafer.
16. (cancelled)
17. (original) The lithography system of claim 15, wherein said illumination light is pre-polarized illumination light, and wherein said pattern polarizing device is a polarizer.
18. (original) The lithography system of claim 15, wherein said illumination light is unpolarized illumination light, and wherein said pattern polarizing device is a polarizer.
19. (previously presented) The system of claim 15, further comprising:
 - (e) a wafer configured to be exposed by the exposure beam.

20. (original) The lithography system of claim 19, further comprising a liquid filling a space between said projection optic and said wafer.
21. (original) The lithography system of claim 15, wherein said pattern polarizing device is included in the projection optic.
22. (original) The lithography system of claim 15, wherein said predetermined polarization pattern is a radial polarization pattern.
23. (original) The lithography system of claim 15, wherein said predetermined polarization pattern is a tangential polarization pattern.
24. (original) The lithography system of claim 15, wherein said predetermined polarization pattern is a custom polarization pattern.
25. (original) The lithography system of claim 15, wherein said mask is one of the group consisting of: a chromeless phase-shift mask, an attenuating phase-shift mask, a binary mask, and an alternating phase-shift mask.
26. (cancelled)
27. (currently amended) A method of producing contact holes on a wafer, comprising:

- (a) producing a polarized illumination beam having a polarization angle that varies across a cross-section of the beam relative to a center point in the beam;
- (b) illuminating a mask with the polarized illumination beam to create an exposure beam, wherein said mask produces contact hole features having a pitch in the exposure beam; and
- (c) exposing a wafer with the exposure beam.

28. (original) The method of claim 27, wherein said step (b) further comprises illuminating a phase-shift mask.

29. (original) The method of claim 27, wherein said step (a) further comprises producing a radially polarized illumination beam.

30. (original) The method of claim 27, wherein said step (a) further comprises producing a tangentially polarized illumination beam.

31. (original) The method of claim 27, wherein said step (a) further comprises producing a custom polarized illumination beam.